

Exemption No. 5623D

**UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056**

In the matter of the petition of

Saab Aircraft AB

for an exemption from § 25.562(c)(5)
of the Federal Aviation Regulations

Regulatory Docket No. 27155

PARTIAL GRANT OF EXEMPTION

By letters RN 150037 dated November 15, 1996, Mr. Tomas Sigbjörnsson, Director, Airworthiness, Saab Aircraft AB, S-581 88 Linköping, Sweden, petitioned for an extension to Exemption 5623C regarding Head Injury Criterion (HIC) of § 25.562(c)(5) for passengers seated behind interior furnishings. The existing exemption expires on December 31, 1996.

Sections of the FAR affected:

Section 25.562(c)(5), as amended by Amendment 25-64, requires that each occupant must be protected from serious head injury under the conditions prescribed in paragraph (b) of this section. Where head contact with seats or other structure can occur, protection must be provided so that the head impact does not exceed a HIC of 1,000 units. The level of HIC is defined by the equation:

$$HIC = \left[(t_2 - t_1) \left[\frac{1}{(t_2 - t_1)} \int_{t_1}^{t_2} a(t) dt \right]^{2.5} \right]_{\max}$$

ANM-97-007-E

Related Section of the FAR:

Section 25.785(a), as amended by Amendment 25-64, requires that each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of those facilities will not suffer serious injury in an emergency landing as a result of inertia forces specified in §§ 25.561 and 25.562. (Due to a non-substantive editorial change, these requirements are contained in § 25.785(a) and (b) of current Part 25.)

The petitioner's supportive information is as follows:

“With reference to FAR 11.25, Saab Aircraft AB hereby requests that the compliance date for Exemption No. 5623 C be extended until 1 July 1998.

“After considerable development work performed on energy absorbing pad designs, we have concluded that this is not a viable option. The work so far performed is in some detail described in Progress Report No 5, 73PCS 1700. (Ref. Report is also enclosed with this Petition)

“We will instead concentrate our efforts on an improved seat design, which in a crash/post-crash situation will prevent the passengers head from contacting interior furnishings.

“We will also continue to closely follow the progress in other areas, such as Airbag Systems, where we now are aware of the Special Condition in this subject, written for Jetstream Model 4100 Series Aircraft. Furthermore, we have recently become aware of other aircraft manufacturers apparently successful work regarding the front row HIC problem. Also these designs will now be studied in detail in order to find a possible solution for SAAB 2000.

“Today there is one SAAB 2000 operator in the US, with a total of three aircraft, which due to their present specific corporate interior layout already comply with the front row HIC requirement.

“However, it is of utmost importance that this request be granted, due to the fact that the present Exemption expires 31 December 1996, and as the problem is still unsolved, this will have, and is already having a major impact on the possibility to sell aircraft to US customers. For this reason, granting an extended Exemption would not impede our continued research and development work.

“It would be in the public interest to allow sufficient time to develop a design solution that will address every combination of seat arrangement and interior furnishings, and at

the same time be commercially acceptable and provide maximum safety benefit.

“Furthermore, even considering the extension requested, and the possible selling of aircraft to US customers, there would, due to long lead times, be relatively few aircraft within the US while the extended Exemption is in effect. Therefore this will not significantly affect the level of safety provided with the regulations.

The FAA finds, for good cause, that action on this petition should not be delayed by the publication and comment procedures for the following reasons: (1) a partial grant of exemption would not set a precedent in that it is for a time extension from a requirement, and not permanent relief from a requirement, and is similar to exemptions that have been granted previously, and (2) delay on acting on the petition would be disruptive and create a major economic burden on the petitioner and the operator.

The FAA's analysis/summary is as follows:

The FAA notes that Saab has been making a good faith effort to comply with the regulation, as noted in their progress reports submitted in accordance with Exemption 5623. Nonetheless, their efforts have focused on energy absorbing pads, which have not shown the promise that had been hoped. The FAA is concerned that a similar effort into seat designs that mitigate head strike concerns could also prove to lack feasibility, whereas technical approaches such as airbags have achieved a high level of maturity. Thus, the FAA cannot base a further extension on the hope that a new solution will become viable.

Design solutions that are available are either too costly, e.g., removal of seats to provide adequate clearance between the seat and interior feature, or considered commercially undesirable, e.g., shoulder harnesses. This recognizes that the additional space required to provide clearance between the front row seat and interior feature is especially costly in smaller transport airplanes such as this, where a single row of seats is a significant portion of the total passenger capacity. Since the granting of Exemption 5623C, one manufacturer has installed upper torso restraints as a means of compliance with front row HIC. The FAA is not aware of any adverse reaction to this installation from the flying public. Thus, the FAA cannot justify the exclusion of upper torso restraints on the basis of commercial grounds in the future. However, even given their technical and commercial viability, upper torso restraints are not a simple add-on to a seat, and will require specific certification programs for a given installation. Therefore, additional time would be necessary to adopt even this solution.

In wishing to encourage development of an optimal solution, the FAA recognizes that it may be counterproductive to establish relatively short compliance dates which can actually inhibit development of optimal solutions in favor of those that appear to be easier to achieve. At the same time, this is an important safety benefit that should not be

unduly delayed by protracted development and optimization programs, once the basic designs become viable. Up to now, the progress in development of front row HIC solutions has been steady, and is not moving into the realm of optimization of minutiae. In consideration of all of the above factors the FAA believes that an extension to the existing exemption is warranted, and that the most benefit to the traveling public is likely to result by allowing sufficient time to develop more optimal solutions to the problem of front row HIC. In addition, there are only three airplanes currently operating in the US fleet, and Saab notes that these already comply due to their interior arrangements. These arrangements are not airline-type arrangements and so the situation cannot be extended to commercial service. However, since the prospect of significant increases to the US fleet size during the period of exemption is low, the FAA considers that safety will not be adversely affected.

In consideration of the foregoing, I find that a Partial Grant of Exemption is in the public interest, and will not significantly affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in §§ 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), the petition of Saab Aircraft AB for exemption from the HIC requirements of §§ 25.562(c)(5) of the FAR, for "front row" seats on SAAB 2000 airplanes, is granted until September 30, 1997. Other provisions of Exemption 5623, together with its conditions and limitations, remain the same and are applicable to this exemption. This amendment is part of, and shall remain attached to, Exemption 5623.

Issued in Renton, Washington, on December 23, 1996

/s/
Stewart R. Miller
Acting Manager,
Transport Airplane Directorate,
Aircraft Certification Service, ANM-100

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